REMARKS

In the present office action claims 11-26 were examined. Claims 11-26 were rejected. Claims 11 and 21 have been amended. No new matter has been added. Claims 11-26 are now believed to be in condition for allowance.

CLAIM REJECTIONS UNDER 35 U.S.C. 103

The Examiner rejected claims 11-26 as being unpatentable over WO 91/09430 in view of Overs et al. The Examiner noted that it would have been obvious for one of ordinary skill in the art to use the co-precipitated oxalate procedure of Overs et al. for preparing the doped ceria material of WO 91/09430 in order to achieve the benefits of low sintering and small grain size.

As amended herein claim 11 now recites the primary limitation of claim 21. Specifically, claim 11 now recites "sintering the educts at a temperature between 750-1200°C *until a density of at least around 98% of the theoretically possible density is reached...*" Page 5, lines 11-17 of the present patent application disclose the first advantage of the process of the present invention as the ability, depending on the process parameters, to produce a sintered oxide ceramic without open porosity in dense structure of more than 98%.

WO 91/09430 discloses some compositions comprising ceria and dopants falling within the formula recited in claim 11. Most importantly WO 91/09430 teaches that the wavers must be sintered at temperatures between 1300°C and 1525°C to form wavers as claimed in the WO publication citation.

The teachings of Overs et al. are strictly directed to solid electrolyte gadolinia-doped ceria prepared by thermal decomposition and mixed-cerium-gadolinium oxalate. The sintering process disclosed by Overs et al. may take place at 1000°C (Page 607, right column, item (6) and Page 608, left column, item (5)). However, Overs et al. discloses as well that the density achieved lies only at 83% (Page 608, left column (5) and summary, line 18) or even at 66% (Page 608, left column, line 7).

It is evident that newly amended claim 11 is now directed to a process wherein sintering continues until a density of at least around 98% of the theoretic possible density is reached. This process is neither taught nor suggested by WO 91/09430 and Overs et al., taken alone or in combination. Specifically, Overs et al., not only lacks a material composition contained in the formula of claim 11 of the present invention, but actually teaches away from the process of the present invention with regards to the

density achieved. As Overs et al. makes clear on the first lines of Page 608, right column, the density of 93% can only be reached at high temperatures, specifically not at within the range claimed in the present invention.

As a result nether WO 91/09430 or Overs et al., taken alone or in combination, teach or suggest the process as recited in amended claim 11 of the present application. As a result claim 11 traverses the Examiner's grounds for rejection. Claim 11 is therefor believed to be in condition for allowance. As claims 12-26 are dependent upon claim 11, claim 11 now believed to be in condition for allowance, claims 12-26 are likewise to believed to be in condition for allowance.

The Examiner additionally rejected claims 11-16, 18-20 and 23-26 as being unpatentable over WO 91/09430 in view of Van Herle. Applicant respectfully responds as follows. Referring to the Van Herle citation at chapter 3 titled "Results" on Page 962, Van Herle emphasizes that a high density of at least 98% is reached at 1400°C and 1300°C. This conclusion is graphically illustrated in Figure 1. Van Herle further comments on Page 963, left column, lines 2-7 that at a low temperature of 1200°C, a 93% density was achieved at this unusually low temperature for ceria. Therefore, the temperature range of Van Herle for a density

of at least around 98%, as recited in amended claim 11 of the present invention, lies at 1300°C or higher. Therefore, for the reasons stated above, neither WO 91/09430 nor Van Herle, taken alone or in combination, teach or suggest achieving a density of at least 98% while sintering the educts at a temperature between 750°C and 1200°C. As a result, the Examiner's rejection to claim 11 is traversed. Claim 11 is therefor believed to be in condition for allowance. As claims 12-16, 18-20 and 23-26 are dependent upon claim 11, claim 11 now believed to be in condition for allowance, claims 12-16, 18-20 and 23-26 are likewise considered to be in condition for allowance.

THE AMENDMENT

Claim 11 has been amended herein to more clearly specify that sintering the educts at a temperature between 750-1200°C occurs "until a density of at least around 98% of the theoretically possible density it reached". None of the citations cited by the Examiner can reach this high density at a temperature at or below 1200°C. In practice a process of the present invention allows the density of at least 98% at temperatures far below 1200°C as made evident with reference to the table of Example I, Figure 7 and Figure 8 of the present invention. As the limitation added

to claim 11 by this amendment is a limitation originally contained in claim 21, claim 21 has been amended to include a separate limitation. Antecedent basis for the limitation of claim 21 as amended may be found on Page 5, lines 15-17 of the present application. No new matter has been added.

An earnest and thorough attempt has been made by the undersigned to resolve the outstanding issues in this case and place same in condition for allowance. If the Examiner has any questions or feels that a telephone or personal interview would be helpful in resolving any outstanding issues which remain in this application after consideration of this amendment, the Examiner is courteously invited to telephone the undersigned and the same would be gratefully appreciated.

It is submitted that the claims as amended herein patentably define over the art relied on by the Examiner and early allowance of same is courteously solicited.

If any fees are required in connection with this case, it is respectfully requested that they be charged to Deposit Account No. 02-0184.

Respectfully submitted,

CHRISTOPH KLEINLOGEL
ET AL.

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Version with markings to show changes made to claims

11. (Amended) A process for production of a sintered oxide ceramic of composition $Ce_xM_yD_zO_{2-a}$ with dense structure without open porosity or with a predetermined porosity comprising the steps of:

using a first doping element M selected from the group consisting of rear earths, but wherein M ≠ Ce, alkali metals, earth alkali metals, and Ga;

using an educt with a second doping element D of at least one metal, but wherein D ≠ M, selected from the group consisting of Cu, Co, Fe, Ni, and Mn wherein second doping element D is of submicron particle size or is a salt solution; and

sintering the educts at a temperature between 750-1200°C until a density of at least around 98% of the theoretically possible density is reached to form said oxide ceramic having a grain size no greater than 0.5 µm and wherein the mol fractions used range from $0.5 \leq x \leq 1$ for Ce, $0 \leq y \leq 0.5$ for first doping element M, and $0 < z \leq 0.05$ for second doping element D.

21. (Amended) The process according to claim 11 wherein sintering [continues until a density of at least around 98% of the theoretically possible density is reached] is prematurely interrupted leading to a porous structure with a specified lower density around 98%.